BOTTOM LINE RECOMMENDATIONS:

Anaphylaxis

Anaphylaxis is a severe hypersensitivity reaction that is rapid in onset and can be potentially fatal. The three principal triggers of anaphylaxis are foods, insect stings and drugs. Food allergy affects approximately 7% of Canadians, and is the most common trigger of anaphylaxis in children. Milk, peanuts, and tree nuts are the most common food allergens among Canadian children with food allergies

ESTABLISHING THE DIAGNOSIS OF ANAPHYLAXIS

- Any **acute onset illness** with **typical skin features** (diffuse urticarial rash or erythema/flushing, and/or angioedema), **PLUS** involvement of **respiratory, cardiovascular**, and/or persistent **gastrointestinal** symptoms; OR
- Any **acute onset** of **hypotension/signs of shock, bronchospasm,** or signs of **upper airway obstruction** after potential exposure to known allergen, **even if typical skin features are not present.**

RISK FACTORS FOR SEVERE ANAPHYLAXIS

Inquire about the following risk multipliers when assessing a child with anaphylaxis

	Factors	Mechanism
Augmenting factors	Physical exercise, menstruation, alcohol, acute illness or infection, drugs (NSAID, ACE-inhibitors)	Lower the reaction threshold or directly influence the immunological mechanism
Co-factors	Emotional stress, travel, psychiatric conditions and medications, drugs (β-blockers)	Potentiate the severity of the reaction through non-immune mechanism
Concurrent diseases	Chronic respiratory conditions (asthma, cystic fibrosis), cardiovascular diseases, and mastocytosis	Lower the physiological reserve or enhance the inflammatory process

MANAGEMENT OF ANAPHYLAXIS (see Anaphylaxis PedsPac Algorithm for more details)

IMMEDIATE INTERVENTIONS

- If possible, remove the allergy trigger.
- Place patient in supine position (unless precluded by vomiting or respiratory distress). Trendelenburg position is **not** recommended. Do not allow the patient to stand or walk.
- **Give intramuscular (IM) epinephrine injection (0.01 mg/kg, maximum 0.5 mg/dose) into outer mid-thigh** using epinephrine ampule (1 mg/mL) and syringe, or epinephrine auto-injector (EAI) if available.
- Assess pulse, blood pressure, electrocardiogram (ECG), pulse oximetry, and mental status.
- If signs of **shock or respiratory distress**, provide O_2 (10-15 L) by non-rebreather mask.
- Upper airway obstruction should be managed by the most skilled clinician available. Use basic airway management to maximize oxygen delivery until support arrives.
- Consider intubation in the presence of stridor, significant upper airway edema and/or respiratory arrest.
- If the child is hypotensive, establish vascular access and push normal saline (20 mL/kg IV), repeat x2 if necessary.

EPINEPHRINE (ADMINISTER IMMEDIATELY)

- Epinephrine is the most important treatment for anaphylaxis that prevents progression to refractory and biphasic anaphylaxis. There are NO absolute contraindications for IM epinephrine in anaphylaxis.
- Do **not** give boluses of IV epinephrine unless indicated for advanced life support. IV epinephrine is associated with significant risk of dosing errors and serious adverse events (e.g. myocardial infarction, malignant arrhythmia, and death).
- Most patients improve after 1-2 doses of IM epinephrine.
- Start **epinephrine IV infusion** if anaphylactic shock persists after THREE doses of IM epinephrine and fluid resuscitation.

ADJUNCTIVE THERAPIES (Refer to Anaphylaxis PedsPac for specific formulations and dosing)

DO NOT DELAY EPINEPHRINE TO GIVE ADJUNCTIVE THERAPIES

Antihistamines

- First-generation H_1 antihistamines (e.g. diphenhydramine and hydroxyzine) should **not** be used, due to the following:
  - Sedative effects leading to dizziness and somnolence, which mimic signs of anaphylaxis
  - Impairment of memory, psychomotor performance, and consequently learning (especially with multiple doses)
  - Risk of fatal cardiac arrhythmias (e.g. QT prolongation, torsade de pointes)
- Second-generation H_1 antihistamines (e.g. cetirizine and rupatadine) are safe and effective in relieving cutaneous symptoms. However, these agents have no role in treating or preventing respiratory or cardiovascular symptoms.

Corticosteroids

- Corticosteroids have **not** been shown to reduce reaction severity or prevent biphasic reactions and should not be routinely administered.

Nebulized epinephrine

- If signs of upper airway obstruction are present, give epinephrine.
- If marked stridor or signs of upper airway obstruction persists after 1-2 doses, prepare for intubation and contact pediatric referral centre.

Inhaled bronchodilator

- Give nebulized Salbutamol (Ventolin®) for persistent wheeze or signs of lower airway obstruction.

EMERGENCY DEPARTMENT MONITORING

- Up to 15% of children are at risk of biphasic reactions, which frequently occur within 3-24h of initial anaphylaxis.
- Risk factors for biphasic anaphylaxis include:
  - Disease severity: cardiac (hypotension) and/or respiratory (persistent wheeze or respiratory distress) signs, initial anaphylaxis requiring >1 dose of epinephrine therapy.
  - Treatment Delay: initial anaphylaxis not treated with timely epinephrine (>60-90 min from onset of initial reaction).
- Monitoring period should be individualized according to risk factors above and risk multipliers for severe anaphylaxis.
- Children with mild anaphylaxis that resolves after one dose of timely epinephrine can be discharged after 4h of monitoring (from administration of epinephrine).
- Prolonged (6-8h) or overnight ED monitoring should be considered for ANY of the following indications:
  - Anaphylaxis requiring 2 doses of epinephrine therapy
  - Patients who present to ED late in the evening
  - Patients who live alone or remote from emergency care
  - Patients with no immediate access to an epinephrine auto-injector (EAI)
  - Patients with a history of severe or current uncontrolled asthma

HOSPITAL ADMISSION

- Admit child to hospital for at least 24h monitoring, if they have any of the following:
  - Presentation with severe anaphylaxis (e.g. anaphylactic shock, severe respiratory distress)
  - Refractory anaphylaxis
  - Anaphylaxis that requires >2 doses of epinephrine
  - Anaphylaxis induced by drugs

ED DISCHARGE

It is imperative that the following aspects of care are covered prior to discharge from the ED:

1. **Referral to an allergy specialist (ALL patients who present with anaphylaxis)**
   - Infants <1 year of age with potential food allergies should be referred **URGENTLY**
2. **Provision of anaphylaxis emergency plan and counseling**
   - Provide the Canadian Anaphylaxis Action Plan for Kids (Kids' CAP) to patients – this plan is designed to educate children and parents on the crucial aspects of anaphylaxis
   - Counselling should include the following: recognition of symptoms and signs of anaphylaxis, management steps (including correct use of an EAI), and allergen avoidance and prevention strategies. These elements are discussed in the Kids' CAP teaching video
3. **Prescription for an epinephrine auto-injector (EAI)**
   - Patients should be provided with a prescription for an EAI and advised to fill the prescription before returning home
   - Instruction on proper EAI use should be verbally reviewed, and patient should be given a trainer device to practice
   - A prescription for **two** EAIs should be considered for patients with **ANY** of the following:
     i. Co-existing asthma and a food allergy
     ii. Co-existing mast cell disease
     iii. Lack of rapid access to medical care
     iv. Previous requirement for >1 dose of epinephrine prior to arrival at hospital
     v. Previous severe or near-fatal anaphylaxis

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